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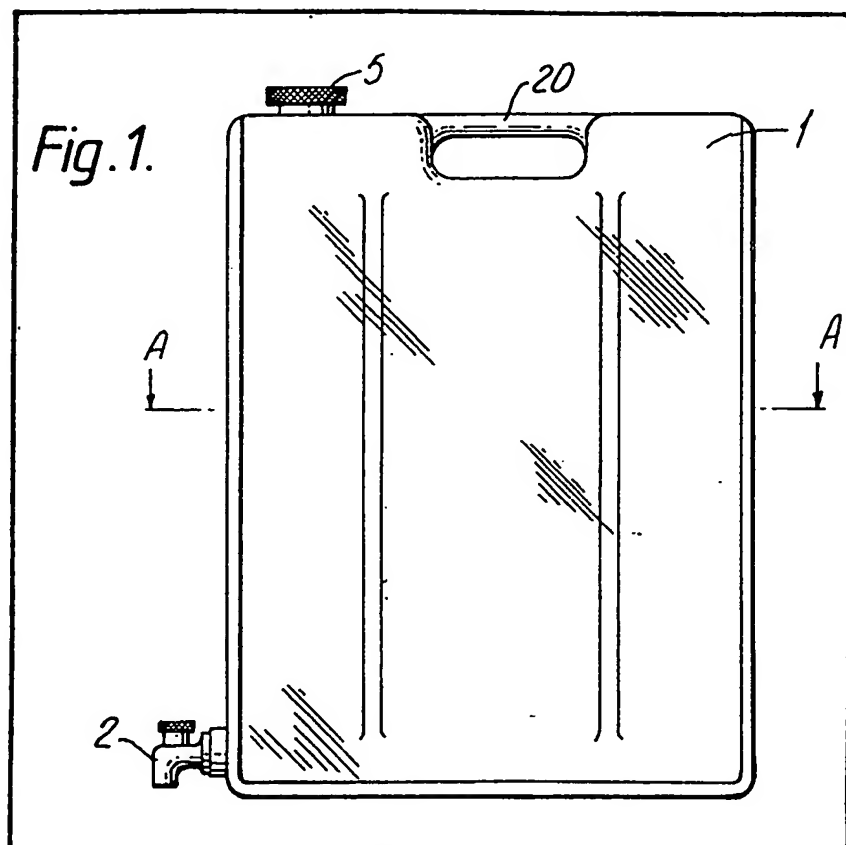
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(54) Solar Heater

(57) A solar water heater (1), formed from a rigid material, preferably plastics, has a compartment defined between a rear wall and an inner front wall. An enclosed air space is formed between the inner front wall and an

outer front wall, the latter, at least, being transmittive of radiant energy from the sun. The rear wall may have an insulating layer therebehind and a reflective material may be placed between the layer and the rear wall. The container is provided with an inlet (5) and preferably also an outlet (2).



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Fig. 1.

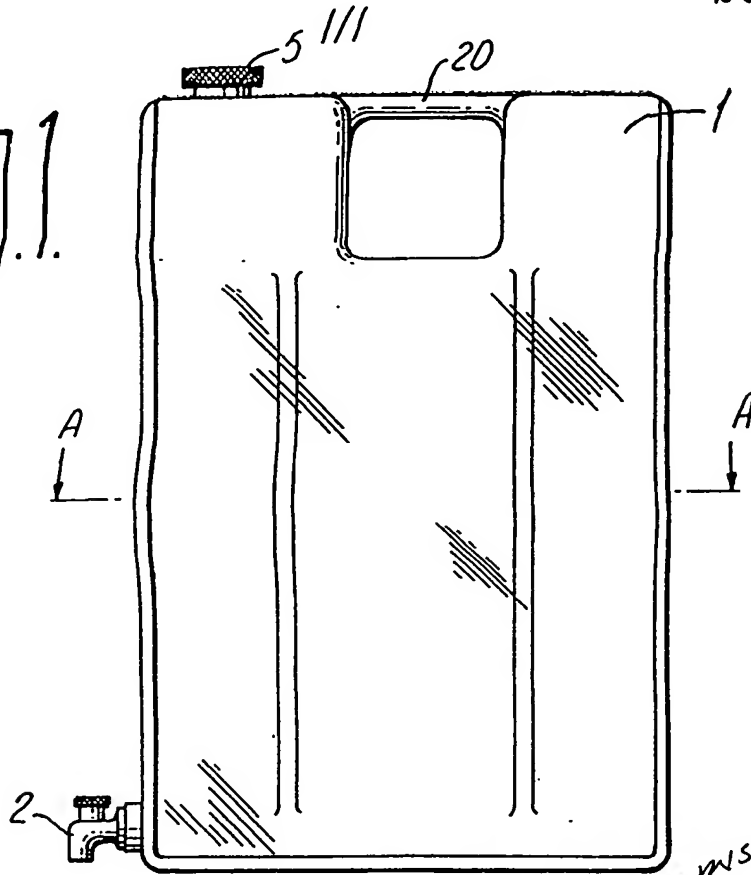


Fig. 2.

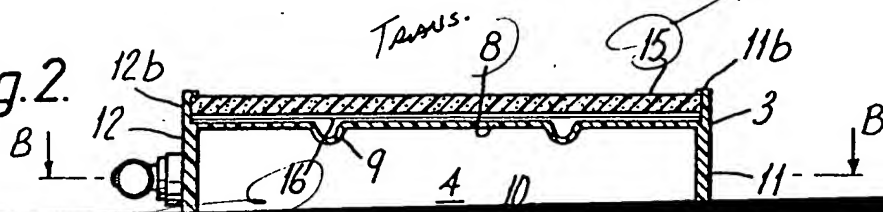


Fig. 3.

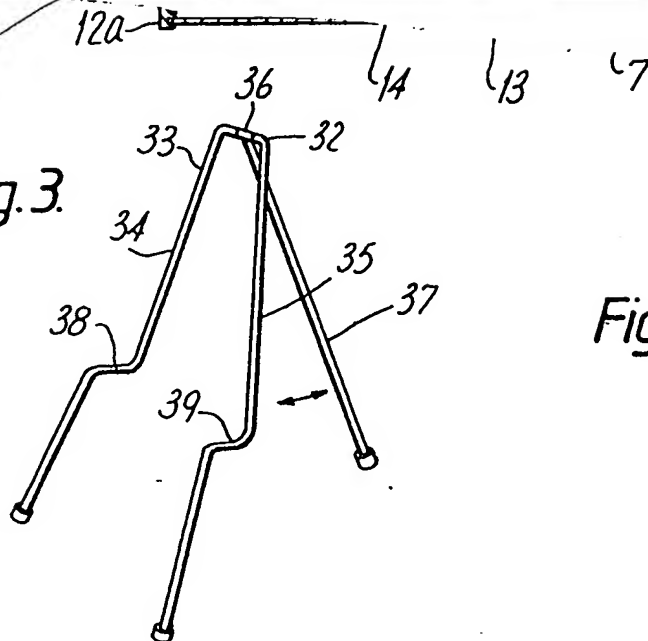


Fig. 4.



SPECIFICATION

Solar Heater

The present invention relates to solar water heaters.

5 One previously proposed solar water heater which had the advantage of portability consisted essentially of two flexible containers, one within the other, giving an interior water container and an insulating air gap around it. Once emptied, it could
10 be folded up to make it more portable. However, such an arrangement had the disadvantages that it would not withstand impact when full of water and was extremely expensive because of the use of non-toxic flexible PVC.

15 According to the present invention, there is provided a portable solar water heater comprising a rigid container, forming a compartment, which is rigid both when full and when empty, an inlet to the compartment, an inner front wall of the
20 compartment and an outer front wall spaced from said inner front wall and defining therewith a closed air space between the inner and outer front walls, the outer front wall being transmittive of radiant energy from the sun.

25 The inner one of the two front walls may either be black so as to absorb the sun's energy or translucent or transparent so as to transmit the sun's energy through the body of water in the compartment, in which case the rear wall should
30 be black.

Alternatively, the rear wall may be made reflective. For example, its front surface may be white or a reflective foil may be placed behind the rear surface. An insulating panel is advantageously
35 located behind the rear wall and the reflective layer may be sandwiched between the rear wall and the panel.

The embodiment of the invention described below, with reference to the accompanying
40 drawing, has a capacity of 10 litres and is provided with a carrying handle so that it can readily be carried about so that it can be used by campers, etc. It is in the form of a self-contained unit with a filler cap at its top and a tap at its bottom so that
45 hot water can be drawn off. In an alternative embodiment, the heater may be constructed so that in association with a number of similar heaters it may form a bank of heaters; the heater may have suitable inlet and outlet points so that
50 natural circulation will enable the bank to be coupled into an indirect water heating system.

The invention will be further described, by way of example only, with reference to the accompanying drawings:—

55 Figure 1 is a side elevational view of one embodiment of the present invention;

Figure 2 is a cross-section taken on A—A in Figure 1;

60 Figure 3 is a perspective view of a stand to be used to support the solar water heater of Figure 1; and

Figure 4 is a detail of a variation in construction of the embodiment of Figures 1 and 2.

The portable solar water heater 1 shown in

65 Figures 1 and 2 is in the form of a rigid container 3 which defines a compartment 4 into which water is poured *via* a filler cap 5 on the top surface of the heater 1. Heated water may be drawn off from the compartment 4 by means of a tap 2 at the bottom
70 of the heater.

The container 3 which defines the compartment 4 comprises two spaced apart panels 7 and 8 which are provided with ridges 9 and 10 which serve to rigidify the structure and
75 enhance its self-supporting capabilities. The container also comprises two side portions 11 and 12 which both project forwardly of the compartment 4 beyond the front panel 7. The projecting portions 11*a* and 12*a* are provided with
80 respective grooves facing one another which receive a transparent panel 13 which is thus supported in parallel spaced apart relation with the front panel 7. The panels 7 and 13 and projections 11*a* and 12*a* thus define a closed 15
85 mm thick air space 14 which serves to prevent heat loss from the water in the compartment 4. The panel 13 is transparent to solar radiation which thus impinges on the front surface of panel 7 which is preferably black and therefore absorbs
90 the heat and in turn heats the water. The efficiency of the heating is enhanced by the "greenhouse" effect provided by the transparent front panel 13. At the rear of the container, the side portions 11 and 12 are provided with
95 respective projections 11*b* and 12*b* which form opposed grooves which receive a 15 mm thick
100 panel 15 of expanded polystyrene which serves to insulate the back of the heater and thus prevent the heat loss from the back. Again to increase the efficiency of the heater the rear of the
105 compartment may be arranged so that radiation passing through the body of water from the front of the compartment is reflected back towards the front. One way to achieve this is to make the panel 9 white. Another way is to make the panel 8
translucent and sandwich between it and the panel 15 a sheet of highly reflective material 16; one example of such a sheet is aluminium foil.

As indicated in Figure 1, the container which
110 may, for example, have a capacity of about 10 litres, is provided with a carrying handle 20 so as to be readily portable. One suitable material for the container 3 is polyethylene as this ensures that the container 3 can be self-supporting while
115 light in weight, the use of polyethylene also assists in manufacture.

It will be appreciated that there are various ways in which the collector 1 and in particular the main body part 3 can be made. One way to make
120 the main body part 3 is by blow-moulding, although in view of the presence of the projections 11*a*, *b* and 12*a*, *b*, it may be more satisfactory to make the body part in two halves split along the plane B—B in Figure 2, the two halves being
125 formed by a vacuum drawing operation and being subsequently joined together by heat-sealing along abutting flanges 30 and 31 as indicated in Figure 4. Making the body part 3 in this way would enable one to produce one of the halves of

e.g. black polyethylene to form the front heat-absorbing panel 10 and the other of white or translucent polyethylene to form the back panel 8.

In view of the presence of the projections 11a, b and 12a, b, it may be preferable, however, to form the container 3 as an extrusion of polyethylene and, after sliding the panels 13 and 15 into place, to complete the container 3 with end pieces at the top and bottom.

Figure 3 shows on a very reduced scale, a stand 32 which may be used with the solar heater 1 of Figure 1. This stand comprises a first part 33 having two legs 34 and 35 which are in a generally "V" configuration and pivoted to the centre point 36 of the part 33 is a rear leg 37 which may be moved forwards and backwards relative to the part 33 so that the legs 34 and 35 can be set at a desired angle to the horizontal. The legs 34 and 35 are provided with elbows at 38 and 39 on which the bottom of the heater 1 rests in use.

The use of such a stand enables the solar heater to be precisely angled relative to the sun's rays so as to optimise the efficiency of the unit.

25 Claims

1. A portable solar water heater comprising a rigid container, forming a compartment, which is rigid both when full and when empty, an inlet to the compartment, an inner front wall of the compartment and an outer front wall spaced from said inner front wall and defining therewith a closed air space between the inner and outer front walls, the outer front wall being transmittive of radiant energy from the sun.

2. A heater according to claim 1, wherein the container also includes a rear wall, means being provided to make said rear wall reflective.

3. A heater according to claim 2, wherein the

means to make the rear wall reflective comprise a white front surface to said rear wall.

4. A heater according to claim 2, wherein the means to make the rear wall reflective comprise a layer of reflective material placed behind said rear wall.

5. A heater according to any preceding claim, wherein a panel of insulating material is located behind said rear wall.

6. A heater according to claim 5, wherein the container includes side portions connecting the inner front wall and the rear wall, the side wall portions projecting rearwardly of the rear wall to form rearwardly extending projections, said projections having grooves therein facing one another, the rear panel being located in said grooves.

7. A heater according to claim 4, 5 and 6, wherein the layer of reflective material comprises a foil sandwiched between said panel and said rear wall.

8. A heater according to any preceding claim, wherein the side wall portions of the compartment extend forwardly of the inner front wall, to form forwardly extending projections, wherein facing grooves are formed in said forwardly extending projections, the outer front wall being located in said grooves.

9. A heater according to any preceding claim, wherein the front wall and portions of the side walls of the compartment are formed as a single piece, wherein the rear wall and the remainder of the side walls are formed as another single piece, the two pieces being secured together at said side walls to form said compartment.

10. A solar water heater substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.